

## 5 CLAIMS

1. A decoder for a wireless communication device comprising a calculator for calculating the modulo of a linear approximation of a MAX\* function; and a selector for selecting a MAX\* output value from the group  $a(n) \bmod F$ ,  $b(n) \bmod F$ , and the calculated modulo based upon a determination as to whether a predetermined threshold value for  $|a(n) - b(n)|$  has been met, where  $a(n)$  is a first state metric,  $b(n)$  is a second state metric, and  $F$  is a value greater than  $|a(n) - b(n)|$ .

2. A decoder according to claim 1, wherein the calculator is arranged to calculate the modulo of a linear approximation of a MAX function using: 
$$\left( a(n) \bmod F + \frac{((b(n) \bmod F - a(n) \bmod F) \bmod F + C)}{2} \right) \bmod F$$
, where  $C$  is the predetermined threshold value.

3. A decoder according to claim 1, wherein the calculator is arranged to calculate the modulo of a linear approximation of a MAX function using:

$$\left( \left( \frac{(a(n) \bmod F + C) \bmod F + b(n) \bmod F}{2} \right) \bmod F + F * s \right) \bmod F$$
, where  $s$  is equal to  $[a(m) \text{ xor } b(m)]$  and  $[((a(m) \text{ xor } a(m-1)) \text{ and } ((b(m) \text{ xor } b(m-1))]$ , and  $C$  is the predetermined threshold value.

4. A decoder according to claim any preceding claim, wherein the determination is based upon the sign of  $(a(n) \bmod F - b(n) \bmod F - C) \bmod F$  and the sign of  $(b(n) \bmod F - a(n) \bmod F - C) \bmod F$ , where  $C$  is the predetermined threshold value.

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5. A decoder according to any preceding claim, wherein the selector is arranged to select and output the modular of the linear approximation of a MAX\*function if the value  $|a(n) - b(n)|$  is less than the predetermined threshold value.

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6. A decoder according to any preceding claim, wherein the value of F is to the power of two.

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7. A decoder according to any preceding claim, wherein the selector is a multiplexer.

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8. A decoder according to any preceding claim, wherein the calculator is an add module that is arranged to receive  $a(n) \bmod F$ ,  $b(n) \bmod F$  and C, where C is the predetermined threshold value.

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9. A method for generating a MAX\* value, the method comprising the steps of: receiving a first modulo state metric  $a(n) \bmod F$ , a second modulo state metric  $b(n) \bmod F$  and a predetermined threshold value for  $|a(n) - b(n)|$ ; calculating the modulo of a linear approximation of a MAX\* function; and selecting a value from the group  $a(n) \bmod F$ ,  $b(n) \bmod F$ , and the calculated modulo based upon a determination as to whether a predetermined threshold value for  $|a(n) - b(n)|$  has been met, where  $a(n)$  is a first state metric,  $b(n)$  is a second state metric, and F is a value greater than  $|a(n) - b(n)|$ .

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- 5 10.A method according to claim 9, wherein the modulo of the linear approximation of a MAX function is calculated using:

$$\left( a(n) \bmod F + \frac{((b(n) \bmod F - a(n) \bmod F) \bmod F + C)}{2} \right) \bmod F, \text{ where } C \text{ is the}$$

predetermined threshold value. w

- 10 11.A method according to claim 9, wherein the modulo of the linear approximation of a MAX function is calculated using:

$$\left( \left( \frac{(a(n) \bmod F + C) \bmod F + b(n) \bmod F}{2} \right) \bmod F + F * s \right) \bmod F, \text{ where } s \text{ is equal to}$$

$[a(m) \text{ xor } b(m)]$  and  $[(a(m) \text{ xor } a(m-1)) \text{ and } (b(m) \text{ xor } b(m-1))]$ , and C is the predetermined threshold value.